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| 10/529,962 | 03/31/2005 | Jurriaan Schmitz | BE02 0028 US | 7450 |

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EXAMINER

LEE, CHEUNG

ART UNIT PAPER NUMBER

2812

DATE MAILED: 02/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/529,962

Applicant(s)

SCHMITZ ET AL.

Examiner

Cheung Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3-31-05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Notice to Applicant

1. Applicants' Preliminary Amendment filed on March 31, 2005 has been entered and made of record.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on March 31, 2005 was filed before the first action on the merits. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "15". In the specification, page 4 and line 33, "the upper side 15" is not shown in drawings. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and

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informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claims 1-10 are objected to because of the following informalities: In claim 1, line 4, substitute "the silicon of the silicon body" with --the surface of the silicon body--.

Claims 2-10 depend from claim 1, so they are objected for the same reason.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors. For example, in claim 1, it is not clear if "a thicker layer of silicon oxide" is forming on an auxiliary layer or under the auxiliary layer. Similar problems as defined are repetitive throughout the entire claim 1, and its dependent claims.

Claims 2-10 depend from claim 1, so they are rejected for the same reason.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 3, 5 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pan et al. (US Pat. 5834358; hereinafter "Pan") in view of Ajuria et al. (US Pat. 5837612; hereinafter "Ajuria").

7. With respect to claim 1, referring to figures 9-14, Pan discloses a method of manufacturing a semiconductor device, wherein a surface 43 of a silicon body 42 is provided with an auxiliary layer 46 of a material (col. 4, lines 20-36) on which, during an oxidation treatment (col. 4, lines 9-19), a thicker layer of silicon oxide 44 is formed than on the surface of the silicon body (see fig. 9), after which, at the location of field isolation regions to be formed (col. 3, lines 41-46), windows are formed in the auxiliary layer (see fig. 10) and grooves 54 are formed in the surface of the silicon body [note that Pan discloses methods of forming field isolation regions (col. 3, lines 41-46), so more than one window and groove exist, but not shown in the figures for simplicity], whereafter an oxidation treatment (col. 5, lines 5-24) is carried out wherein the walls of the grooves and of the windows are provided with a layer of silicon oxide 64 (see fig. 11), but wherein it is precluded that the auxiliary layer adjacent to the windows is oxidized across the entire thickness (see fig. 11), after which, successively, a layer of isolating material 72 is deposited in a thickness such that the grooves and the windows are filled

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completely (see fig. 12), a planarization treatment (col. 5, lines 45-56) is carried out until the non oxidized part of the auxiliary layer is exposed (see fig. 13), after which this part of the auxiliary layer is removed (see fig. 14), characterized in that a layer 46 comprising silicon (col. 4, lines 20-36; col. 5, lines 57-67) is applied as an auxiliary layer to the surface of the silicon body, but Pan does not disclose expressly the auxiliary layer which comprises germanium.

Referring to figures 6-12, Ajuria discloses an oxidizable layer 106, which comprises germanium silicon (col. 5, lines 41-60). Also, Ajuria discloses that a polysilicon layer can be replaced with germanium silicon oxidizable material (col. 5, lines 41-60). So, germanium silicon being equivalent to polysilicon can replace polysilicon, the oxidizable layer 46, in Pan (col. 4, lines 20-36). Therefore, at the time of the invention it would have been obvious to replace polysilicon layer with germanium silicon layer when germanium silicon is readily available.

8. With respect to claim 3, Pan in view of Ajuria discloses wherein the auxiliary layer is applied in a thickness such that this layer is not converted across the entire thickness into an oxide during the oxidation treatment (see Pan's fig. 11).

9. With respect to claims 5 and 9, Pan in view of Ajuria discloses wherein prior to applying the auxiliary layer to the surface of the silicon body, this surface is provided with a layer of silicon oxide (Pan, 44), and the windows are also formed in the layer of silicon oxide (see Pan's fig. 10).

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10. Claims 2, 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pan in view of Ajuria, as applied above, and further in view of Peterson et al. (US Pat. 6545299; hereinafter "Peterson").

11. With respect to claim 2, Pan in view of Ajuria does not disclose expressly wherein on the surface of the silicon body a layer of $\text{Si}_x\text{Ge}_{1-x-y}\text{C}_y$, where $0.70 < x < 0.95$ and $y < 0.05$, is provided as the auxiliary layer.

Peterson discloses a material that comprises Si-Ge-C or Si-Ge (col. 3, lines 5-9), and Si-Ge-C refers to $\text{Si}_{1-x-y}\text{Ge}_x\text{C}_y$ (col. 2, lines 60-65). Peterson does not disclose expressly the value of x and y. However, any variation in stoichiometry of Si-Ge-C in the present claim is obvious in light of the cited art, because the changes in stoichiometry of Si-Ge-C produce no unexpected function. The routine varying of parameters to produce expected changes are within the ability of one of ordinary skill in the art. Patentability over the prior art will only occur if the parameter variation produces an unexpected result. *In re Aller, Lacey and Hall*, 105 USPQ 233, 235. *In re Reese* 129 USPQ 402, 406. Si-Ge is replaceable with Si-Ge-C, and Pan in view of Ajuria discloses germanium silicon layer (Ajuria, col. 5, lines 41-60). Therefore, it would have been obvious to use Si-Ge-C layer instead of germanium silicon layer since the two layers are equivalently used.

12. With respect to claim 6, the combined teaching of Pan, Ajuria and Peterson discloses wherein the auxiliary layer is applied in a thickness such that this layer is not converted across the entire thickness into an oxide during the oxidation treatment (see Pan's fig. 11).

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13. With respect to claim 8, the combine teaching of Pan, Ajuria and Peterson discloses wherein prior to applying the auxiliary layer to the surface of the silicon body, this surface is provided with a layer of silicon oxide (Pan, 44), and the windows are also formed in the layer of silicon oxide (see Pan's fig. 10).

14. Claims 4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pan in view of Ajuria, as applied above, and further in view of Lam (US Pat. 6413828).

15. With respect to claim 4, Pan in view of Ajuria discloses the window, which forms in the auxiliary layer (see Pan's fig. 10), but Pan in view of Ajuria does not disclose expressly wherein a layer of silicon nitride is applied to the auxiliary layer, the windows being formed in the layer of silicon nitride.

Referring to figures 2A-2E, Lam discloses a silicon nitride layer 108 on a middle polysilicon layer 106 (fig. 2A; col. 3, line 66-col. 4, line 11), and an opening in the silicon nitride (see fig. 2B).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use a silicon nitride layer on an oxidizable layer, as taught by Lam.

The motivation for doing so would have been to use nitride layer as a hard mask on the oxidizable layer controlling the oxidation area to fulfill the requirements of a specific application.

16. With respect to claim 10, the combine teaching of Pan, Ajuria and Lam discloses wherein prior to applying the auxiliary layer to the surface of the silicon body, this

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surface is provided with a layer of silicon oxide (Pan, 44), and the windows are also formed in the layer of silicon oxide (see Pan's fig. 10).

17. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teaching of Pan, Ajuria and Peterson, as applied above, and further in view of Lam.

The combined teaching of Pan, Ajuria and Peterson discloses the window, which forms in the auxiliary layer (see Pan's fig. 10), but the combined teaching of Pan, Ajuria and Peterson does not disclose expressly wherein a layer of silicon nitride is applied to the auxiliary layer, the windows being formed in the layer of silicon nitride.

Referring to figures 2A-2E, Lam discloses a silicon nitride layer 108 on a middle polysilicon layer 106 (fig. 2A; col. 3, line 66-col. 4, line 11), and an opening in the silicon nitride (see fig. 2B). The motivation and arguments stated in claim 4 also apply.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cheung Lee whose telephone number is 571-272-5977. The examiner can normally be reached on Monday through Friday from 8:30AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Cheung Lee

February 14, 2006



HA NGUYEN
PRIMARY EXAMINER